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Fluvial landscapes – an important ecological dimension within European protected areas

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Abstract

This presentation aims to give an exemplary overview about fluvial landscapes covered by protected areas across Europe. The main data sources about protected areas are the Natura 2000 data and the World Database on Protected Areas. Briefly, fluvial landscapes are an important ecological dimension within European protected areas, though there are spatially differences in frequency across Europe.

Keywords

Natura 2000, RAMSAR, WDPA

Introduction

In general, fluvial can be described as '*of or pertaining to rivers, produced by the action of a river or stream*.' In the broadest sense, fluvial landscapes include all landforms and biologic communities that are affected by the flow of water, sediment, and organic materials within the hierarchically branching network of river corridors. Fluvial landscapes comprise active and former river channels, off-channel water bodies, confluence environments, wetlands, floodplains, terraces, riparian vegetation, subsurface patterns of hyporheic flow and all habitat associated organisms. The fluvial landscape can thus be understood as a spatially dynamic entity, formed, and altered over time, by hydroecological processes related to a specific catchment (BENDA et al. 2011).

The IUCN (2017 a) defines protected areas as: '*A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*.'

Protected areas can be categorized in several ways. Regarding the management objectives, the IUCN proposes following categories: Ia Strict Nature Reserve, Ib Wilderness Area, II National Park, III Natural Monument or Feature, IV Habitat/Species Management Area, V Protected Landscape/ Seascape, VI Protected area with sustainable use of natural resources (IUCN 2017b).

Another classification system may be e.g. the type of protected area as legally/officially designated or proposed: **Regional** - Protected areas designated or proposed at the regional level, **National** - Protected areas designated or proposed at the national or sub-national level, **International** - Protected areas designated or proposed through international conventions (PROTECTED PLANET 2017).

Several protected area frameworks are already implemented. At the spatial scale of European Union (EU) for example, the aim of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitat Directive, adopted on 21 May 1992) is to promote the maintenance of biodiversity, taking account of economic, social, cultural, and regional requirements (EC a). Both Habitat Directive and Bird Directive (EC b) establish the EU wide Natura 2000 ecological network of protected areas.

On the international level, important frameworks are e.g. UNESCO-MAB Biosphere Reserves, Ramsar Sites, or World Heritage Sites. Under the Convention on Wetlands of International Importance, called the Ramsar Convention, the contracting parties are committed to: work towards the wise use of all their wetlands; designate suitable wetlands for the list of Wetlands of International Importance (the 'Ramsar List') and ensure their effective management; cooperate internationally on transboundary wetlands, shared wetland systems and shared species (RAMSAR CONVENTION 2017). The Convention uses a broad definition of wetlands and includes also running waters.

This presentation aims to give an exemplary overview about fluvial landscapes covered by protected areas across Europe.

Methods

The main data sources about protected areas are the Natura 2000 data (EEA 2017 a) and the World Database on Protected Areas (WDPA) (IUCN and UNEP-WCMC 2017). The Delineation of Riparian Zones data set (EEA 2017 b) was used as (visual) support for on-screen-selecting exemplary protected areas of fluvial landscapes. The Interpretation Manual of European Union Habitats (EC 2013) gives indication of habitats relevant to fluvial landscapes.

Results

The Interpretation Manual (EC 2013) compiles 17 habitats in the section **Freshwater Habitats – Running water**: 3210 Fennoscandian natural rivers, 3220 Alpine rivers and the herbaceous vegetation along their banks, 3230 Alpine rivers and their ligneous vegetation with *Myricaria germanica*, 3240 Alpine rivers and their ligneous vegetation with *Salix elaeagnos*, 3250 Constantly flowing Mediterranean rivers with *Glaucium flavum*, 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, 3270 Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation, 3280 Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix* and *Populus alba*, 3290 Intermittently flowing Mediterranean rivers of the *Paspalo-Agrostidion*, 32A0 Tufa cascades of karstic rivers of the Dinaric Alps. Further water-dependent habitats in fluvial ecosystems are 91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*), 91F0 Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*), 92A0 *Salix alba* and *Populus alba* galleries, 92B0 Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others, 92C0 *Platanus orientalis* and *Liquidambar orientalis* woods (*Plantanion orientalis*), 92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*), 9370 * Palm groves of *Phoenix*). Further habitats typically for standing waters (e.g. *3130* Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*, 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* or 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation amongst others) may also situated in fluvial landscapes, but aren't included in this analysis.

Running water is here defined as sections of water courses with natural or semi-natural dynamics (minor, average and major beds) where the water quality shows no significant deterioration (EC 2013).

At the end of year 2016, the Natura 2000 network database incorporates 27527 protected areas, thereof 9135 sites cover one or more habitat types related to running waters. 8745 of these protected areas are connected to the Habitat Directive. About 49 % of the sites are within the Continental biogeographic region, followed by the Mediterranean (16 %), Atlantic (10%), Alpine (9%) and Boreal (8%) biogeographic region (see Fig. 1).

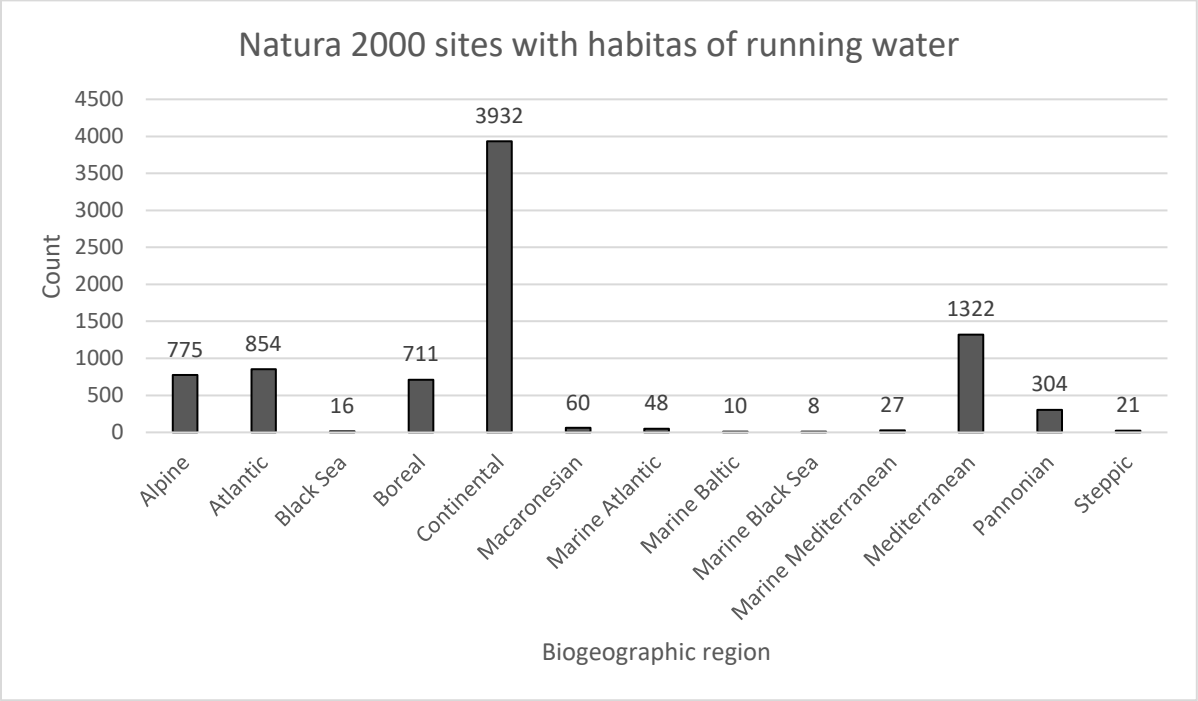

Figure 1: Natura 2000 sites with habitats of running water in the European biogeographic regions

Several of these protected areas implemented after the Habitat Directive are explicitly dedicated to running waters and their fluvial landscapes and covers large river sections. Examples are e.g. Durance (FR9301502 Steppique Durancien et Queyrassin, FR9301589 La Durance), Ticino (IT2080002 Basso corso e sponde del Ticino), Isel (AT3314000 Osttiroler Gletscherflüsse Isel, Schwarzach und Kalserbach), Isar (DE8034371 Oberes Isartal, DE7537301 Isarauen von Unterföhring bis Landshut) or Mura (AT2213000 Steirische Grenzmur mit Gamlitzbach und Gnasbach, SI3000215 Mura, HR2000364 Mura). Otherwise a high portion of these 8745 protected areas covers only parts or sections of running waters and their fluvial landscapes.

Some of them have more than one conservation/protection label, e.g. protected area according to the Habitat Directive like AT1204000 Donau-Auen östlich von Wien and AT1202000 March–Thaya-Auen (both dedicated

additionally whether as a national park or as a transboundary Ramsar site, i.e. Trilateral Ramsar Site Floodplains of the Morava-Dyje-Danube Confluence) or AT3309000 Tiroler Lech (includes also a regional Nature Reserve).
In Austria, more than 60% of all ascertained floodplains are part of the Natura 2000 network, that are 60.213 ha (LAZOWSKI & SCHWARZ, 2014).

Selecting the Ramsar sites out of WDPA by the Delineation of Riparian Zones data combined with quick visual correction shows that about 70 protected areas according to the Convention of Wetlands cover running waters and (parts of) their fluvial landscapes.
Spatial filtering for the Balkan region, the WDPA data compiles 462 protected areas for these non-EU countries (Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro, and Serbia); a spatial selection by the Delineation of Riparian Zones combined with quick visual correction shows about 50 sites covering running waters and (parts of) their fluvial landscapes. The main protection categories are here: Landscape of Outstanding Qualities, Managed Nature Reserve (category IV IUCN), National Park, National Park (category II), Natural Monument, Protected habitat, and Ramsar Site.

The Kopački rit, a known and large fluvial landscape in the Balkan region, is shared by EU and non-EU-countries. Several protected areas with different categories cover river and fluvial landscape; the categories are here Nature Park, Nature Reserve, Ramsar Site, Site of Community Importance (Habitats Directive), Special Protection Area (Birds Directive), Special Reserve. Otherwise, high-value (near) natural rivers in the Balkan region, e.g. Vjosë (Albania), are not under any protection.

Delineation of Riparian Zones data is not available for East-European non-EU countries like Belarus, Georgia, Moldova, Russia, or Ukraine; thus, a quick visual selection of the WDPA data in GIS was performed. In this European region, some rivers and (parts of) their fluvial landscape are protected as e.g. Managed Resource Protected Areas, Ramsar Sites, Regional Landscape Parks, Managed Reserves, or other protected areas on national level with IUCN category IV.

Discussion/Conclusio

In summary, fluvial landscapes are an important ecological dimension within European protected areas. There are spatially differences in frequency across Europe, with a high density in the EU.

Within the EU, Habitat Directive and Bird Directive are important legal drivers to include running waters and their fluvial landscapes in the protected area network Natura 2000. These directives are mainly focused on conservation and sustainable land use. In addition, on the international level, the Convention on Wetlands of International Importance is another important framework to implement protected areas spanned over fluvial landscapes, with focus on a wise and sustainable use.

Different protected areas categories cover fluvial landscapes, resulting in a variety of various legal, conservation and management/land use implications: from high level National Parks, over Managed Resource Protected Areas to Nature Parks more focused on rural development. A small portion of these sites, mostly of them in the EU, are labelled by more than one category.

Regarding the spatial envelope of protected areas along running waters and fluvial landscapes, a heterogeneous pallet of implementations can be observed; from including the entire running water and fluvial landscape to involving only a section of these ecological entities into a protected area. As fluvial landscapes are dynamically embedded into their surroundings, spatial extent and envelope of the protected areas influence the options of management and sustainable use and thus the successful achieving of the conservation targets.

References

BENDA, L., MILLER, D. & BARQUÌN, J. 2011. Creating a catchment scale perspective for river restoration. Hydrol. Earth Syst. Sci., 15, 2995–3015. Available at: www.hydrol-earth-syst-sci.net/15/2995/2011/ (accessed: 30/07/17)

EUROPEAN COMMISSION (EC), DG ENVIRONMENT, NATURE ENV B.3 2013. Interpretation Manual of European Union Habitats - EUR28. Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf (accessed: 30/07/17)

EUROPEAN COMMISSION (EC) 2017 a. The Habitats Directive. Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm (accessed: 30/07/17)

EUROPEAN COMMISSION (EC) 2017 b. The Birds Directive. Available at: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm (accessed: 30/07/17)

EUROPEAN ENVIRONMENT AGENCY (EEA) 2017 a. Natura 2000 data - the European network of protected sites. Available at: https://www.eea.europa.eu/data-and-maps/data/natura-8 (accessed: 30/07/17)

EUROPEAN ENVIRONMENT AGENCY (EEA) 2017 b. Delineation of Riparian Zones. Available at: http://land.copernicus.eu/local/riparian-zones/riparian-zones-delineation/ (accessed: 30/07/17)

IUCN 2017 a. What is a protected area? Available at: https://www.iucn.org/theme/protected-areas/about (accessed: 30/07/17)

IUCN 2017 b. Protected Areas Categories? Available at: https://www.iucn.org/theme/protected-areas/about/protected-areas-categories (accessed: 30/07/17)

IUCN AND UNEP-WCMC 2017. The World Database on Protected Areas (WDPA) [On-line], [07/17], Cambridge, UK: UNEP-WCMC. Available at: www.protectedplanet.net (accessed: 30/07/17)

LAZOWSKI, W. & SCHWARZ, U. 2014. Auenland (Austrian Floodplain Inventory). Österreichischer Naturschutzbund (Ed.), 103 pp. + Maps. Available at: http://naturschutzbund.at/auenschutz-mit-strategie.html (accessed: 15/08/17)

PROTECTED PLANET 2017. WDPA Lookup tables (WDPA). Available at: https://protectedplanet.net/c/wdpa-lookup-tables (accessed: 30/07/17)

RAMSAR CONVENTION 2017. The Ramsar Conventions and its mission. Available at: http://www.ramsar.org/about/the-ramsar-convention-and-its-mission (accessed: 30/07/17)

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